APPENDIX B

TABLES

Table 2: Base Packet Summary

Description	ID Number	Length (Bytes)	Comments
Text Message Packet – Single Tracker or Entire	0x01	Variable	Indicates message and response set for a tracker/fleet message.
Text Message Packet – Tracker Group	0x02	Variable	Indicates message and response set for group message.
Tracker Group Message Interface ID List Packet	0x03	Variable	Indicates group of recipient ID's for text and user data messages.
Pre-defined Message Definition	0x1D	Variable	Provides a pre-defined message definition to tracker modules on a per customer basis.
Pre-defined ID Message Packet – Single Tracker or Entire Fleet	0x04	Variable	User Specific
Pre-defined ID Message Packet – Tracker Group	0x05		Indicates user data for group message.
DGPS Packet	0x06	Variable	Computed by NTCC
User Data Message Packet – Single Tracker	0x07	Variable	User specific
User Data Message Packet – Tracker Group	0x08	Variable	User specific
Grid ID Packet	0x09	11	
FM Identification Packet	0x0a	13	
UHF Identification Packet	0x0b	5	
GPS Time Packet	0x0c	7	Computed by NTCC
Set Main Repeating Interval Slot Definition Packet	0x0d	12	Assigns main repeating interval and Network/Interface ID.
Add Auxiliary Repeating Interval Slot Definition – Single Interval by Tracker ID Packet	0x0e	10	Assigns auxiliary repeating intervals
Add Auxiliary Repeating Interval Slot Definition – Single Interval by Network/Interface ID Packet	0x0f	8	
Add Auxiliary Repeating Interval Slot Definition – Limited Number of Intervals by Tracker ID Packet	0x10	11	Assigns auxiliary repeating intervals
Add Auxiliary Repeating Interval Slot Definition – Limited Number of Intervals by Network/Interface ID Packet	0x11	9	
Available Network Entry Slots Packet	0x12	8	Sent once per minute.

Table 2 (continued)

Repeating Interval Slot Config Info Packet	0x13	3		Sent once per minute. Used to determine transmit timing/format of periodic update tracker packets.
	0x14			
Network Entry Response Packet	0x15	6		
Network Entry Request Permission Packet	0x16	5		
Purge Assigned Repeating Intervals – By Tracker ID, Customer ID, or Tracker ID List Packet	0x17	6		
Message Response Acknowledge	0x18	Variable		Acknowledges Text and Predefined Message Responses
Site Dispatch Message	0x19	Variable		Provides tracker with job site location and message for user.
User Data Acknowledge	0x1a	Variable		Acknowledges reliable user data packets.
Grid Identification 2	0x1b	13		Defines RF Navigation grid and indicates NDC Server Boot Sequence ID
Site Purge Message	0x1c	Variable		Erases a known site from a tracker.
Site Status Acknowledge	0x1e			

Table 3: Text Message Packet – Single Tracker or Entire Fleet

# of bytes	Description
1	Packet ID: 0x01
1	Bits 0-2: Response Set[1] (predefined set of response choices) Bit 3-4: Address Mode 0= Tracker ID, 1 = Network/Interface ID, 2 = Customer ID Bit 5-7: Spare
3	Message Sequence ID (unique for each customer)
Variable	Tracker ID (4 bytes), Network/Interface ID (2 bytes), Customer ID (3 bytes)
3	Send Time[2] (GPS Second)[2]
1	Message Length (L_1)
L_1	Message

[1] The table below indicates the predefined response sets.

[2] Indicates the time the message was originally sent. NOTE: Since only the GPS second is provided, tracker modules may assume that the message is less than one GPS week old.

Table 4: Pre-defined Message Response Sets

Response Set ID	MDT Softkey 1	MDT Softkey 2	MDT Softkey 3	MDT Softkey 4
0[1]	{BLANK}	{BLANK}	{BLANK}	{BLANK}
1	Yes	No	Call	{BLANK}
2	OK	{BLANK}	{BLANK}	{BLANK}
3	OK	Cancel	Call	{BLANK}
4	Accept	Decline	Call	{BLANK}
5	{BLANK}	{BLANK}	{BLANK}	{BLANK}
6	{BLANK}	{BLANK}	{BLANK}	{BLANK}
7	{BLANK}	{BLANK}	{BLANK}	{BLANK}

[1] Response Set ID indicates that no pre-defined response is required. However, a custom response set may still be defined within the message. Custom response sets may be defined by appending response set values to the message. Response set values are delimited by a "|" (vertical bar) character.

Table 5: Text Message Packet – Tracker Group

# of bytes	Description
1	Packet ID: 0x02
1	Bits 0 –2: Response Set (predefined set of response choices) Bits: 3 – 7: spare
3	Customer ID
3	Message Sequence ID (unique for each customer)
3	Send Time (GPS Second)[2]
1	Message Length (L_1)
L_1	Message

[1] See Pre-defined Message Response Sets for more information about response sets.
NOTE: Text messages sent to a group of trackers will be sent two packets. One packet contains the text message, Customer ID, and Message Sequence ID while the other packet contains the tracker ID's, Customer ID, and Message Sequence ID.
[2] Indicates the time the message was originally sent. NOTE: Since only the GPS second is provided, tracker modules may assume that the message is less than one GPS week old.

Table 6: Tracker Group Message Interface ID List Packet

# of bytes	Description
1	Packet ID: 0x03
2	Message Length[1]
1	Tracker ID List Block Count ($TILBC_1$)
Variable	Tracker ID List Block #1
...	
Variable	Tracker ID List Block #$TILBC_1$
3	Message Sequence ID (unique for each customer)
3	Customer ID

[1] Indicates the total length of this message excluding the packet ID and the Message Length value.

Table 7: Tracker ID List Block

# of bytes	Description
1	Tracker ID Block Type/Size Bits 0 – 3 : ID Type (0 – Network ID List[1], 1 – Interface ID List Within a Network[1], 2 – Interface ID Range Pairs Within a Network[1], 3 – Network/Interface ID, 4 – Tracker ID) Bit 4 : Network Size ID[1] (0 = 256 Trackers, 1 = 16 Trackers) 5 – 7 : Spare
1	Network ID Count (NC)/ID Count (IC)

Variable	ID Type	Network Size	# of bytes	Description	
	0	0	1	Network ID #1	
			...		
			1	Network ID #NC	
		1	3	Bits 0 – 11: Network ID #1 Bits 12 – 23: Network ID #2	
			...		
			3	Bits 0 – 11: Network ID # NC - 1 Bits 12 – 23: Network ID # NC	
	1	0	1	Network ID #1	
			1	Interface ID Count (IIC_1)	
			1	Interface ID #1	
			...		
			1	Interface ID #IIC_1	
			...		
			1	Network ID #NC	
			1	Interface ID Count (IIC_{NC})	
			1	Interface ID #1	
			...		
			1	Interface ID # IIC_{NC}	
		1	2	Network ID #1	
			1	Interface ID Count (IIC_1)	
			1	Bits 0 – 3: Interface ID #1 Bits 4 – 7: Interface ID #2	
			...		
			1	Bits 0 – 3: Interface ID # IIC - 1 Bits 4 – 7: Interface ID # IIC	
			...		
			2	Network ID #NC	
			1	Interface ID Count (IIC_{NC})	

Table 7 (continued)

			1	Bits 0 – 3: Interface ID #1 Bits 4 – 7: Interface ID #2
			...	
			1	Bits 0 – 3: Interface ID # IIC_{NC} - 1 Bits 4 – 7: Interface ID # IIC_{NC}
	2	0	1	Network ID #1
			1	Interface ID Pair Count ($IIPC_1$)
			1	Interface ID Pair #1 Start
			1	Interface ID Pair #1 End
			...	
			1	Interface ID Pair # $IIPC_1$ Start
			1	Interface ID Pair # $IIPC_1$ End
			...	
			1	Network ID #NC
			1	Interface ID Pair Count ($IIPC_{NC}$)
			1	Interface ID Pair #1 Start
			1	Interface ID Pair #1 End
			...	
			1	Interface ID Pair # $IIPC_{NC}$ Start
			1	Interface ID Pair # $IIPC_{NC}$ End
		1	2	Network ID #1
			1	Interface ID Pair Count ($IIPC_1$)
			1	Bits 0 – 3: Interface ID Pair #1 Start Bits 4 – 7: Interface ID Pair #1 End
			...	
			1	Bits 0 – 3: Interface ID # $IIPC_1$ Start Bits 4 – 7: Interface ID # $IIPC_1$ End
			...	
			2	Network ID #NC
			1	Interface ID Pair Count ($IIPC_{NC}$)
			1	Bits 0 – 3: Interface ID #1 Start Bits 4 – 7: Interface ID #1 End
			...	
			1	Bits 0 – 3: Interface ID # $IIPC_{NC}$ Start Bits 4 – 7: Interface ID # $IIPC_{NC}$ End
	3	N/A	2	Bits 0 – 15: Network Interface ID #1
			...	
			2	Bits 0 – 15: Network Interface ID # IC_1
	4	N/A	4	Tracker ID #1
			...	
			4	Tracker ID # IC_1

Table 8 : Pre-defined ID Message Definition Packet

# of bytes	Description
1	Packet ID: 0x..D
3	Customer ID
1	Pre-defined Message ID
1	Message Length (L_1)
L_1	Message

Table 9 : Pre-defined ID Message Packet – Single Tracker or Entire Fleet

# of bytes	Description
1	Packet ID: 0x04
1	Bits 0-2: Response Set[1] (predefined set of response choices) Bits 3-4: Address Mode 0= Tracker ID, 1= Network/Interface ID, 2 = Customer ID Bit 5-7: Spare
3	Message Sequence ID (unique for each customer)
Variable[2]	Tracker ID (4 bytes), Network/Interface ID (2 bytes), Customer ID (3 bytes)
3	Send Time (GPS Second)[3]
1	Pre-defined Message ID
2	Pre-defined Message 16 Bit CRC
1	Custom Response Set Length (L_1)
L_1	Custom Response Set[3]

[1] See Pre-defined Message Response Sets for more information about response sets.

[2] Indicates the time the message was originally sent. NOTE: Since only the GPS second is provided, tracker modules may assume that the message is less than one GPS week old.

[3] If the Pre-defined response set is 0, this pre-defined message packet may contain a custom set of pre-defined response sets.. Custom response set values are delimited by a "|" (vertical bar) character.

Table 10: Pre-defined ID Message Packet – Tracker Group

# of bytes	Description
1	Packet ID: 0x05
2	Message Length[1]
1	Bits 0-2: Response Set[2] (predefined set of response choices) Bit 3-7: Spare
1	Tracker ID List Block Count ($TILBC_1$)
Variable	Tracker ID List Block #1
...	
Variable	Tracker ID List Block #$TILBC_1$
3	Send Time (GPS Second)[3]
1	Pre-defined Message ID
2	Pre-defined Message 16 Bit CRC
1	Custom Response Set Length (L_1)
L_1	Custom Response Set[4]

[1] Indicates the total length of this message excluding the packet ID and the Message Length value.

[2] See Pre-defined Message Response Sets for more information about response sets.

[3] Indicates the time the message was originally sent. NOTE: Since only the GPS second is provided, tracker modules may assume that the message is less than one GPS week old.

[4] If the Pre-defined response set is 0, this pre-defined message packet may contain a custom set of pre-defined response sets. Custom response set values are delimited by a "|" (vertical bar)

Table _11_: DGPS Packet

Byte Number	Description
0	Packet ID: 0x06
1	Bits 0-5: RTCM Frame ID (0-63) Bits 6-7: Spare
2	Bits 0-4: Number of SVs in the message $(0 \Rightarrow 32\ SVs = N_{SV})$ Bits 5-7: Spare
3-4	Bits 0-12: RTCM–104 Modified Z-Count Bits 13-15: Station Health
$(i=0-N_{SV}-1)$	Correction Data for each SV follows (5 bytes each)
5+5i	Bits 0-4: SV PRN ID of this correction $(0 \Rightarrow PRN\ 32)$ Bits 5-6: User Differential Range Error Bit 7: Scale Factor
6+5i	IODE
7+5i-8+5i	Pseudorange Correction
9+5i	Pseudorange-rate Correction

Table _12_: User Data Message Packet – Single Tracker or Entire Fleet

# of bytes	Description
1	Packet ID: 0x07
1	Bits 0-2: Spare[2] Bits 3-4: Address Mode 0= Tracker ID, 1= Network/Interface ID, 2 = Customer ID Bit 5-7: Spare[2]
3	Message Sequence ID
Variable	Tracker ID (4 bytes), Network/Interface ID (2 bytes), Customer ID (3 bytes)
3	Send Time (GPS Second)[1]
1	Message Length (L_1)
L_1	Message

[1] Indicates the time the message was originally sent. NOTE: Since only the GPS second is provided, tracker modules may assume that the message is less than one GPS week old.

[2] Spare values were split to allow Address Mode to be in same position for all messages.

Table _13_: User Data Message Packet – Tracker Group

# of bytes	Description
1	Packet ID: 0x08
3	Customer ID
3	Message Sequence ID
3	Send Time (GPS Second)[1]
1	User Data Length (L_1)
L_1	User Data

NOTE: User data sent to a group of trackers will be sent two packets. One packet contains the user data, Customer ID, and Message Sequence ID while the other packet contains the tracker ID's, Customer ID, and Message Sequence ID. See Tracker Group Message Interface ID List Packet to identify the trackers receiving this user data packet.

[1] Indicates the time the message was originally sent. NOTE: Since only the GPS second is provided, tracker modules may assume that the message is less than one GPS week old.

Table 14: Grid ID Packet

Byte Number	Description
0	Packet ID: 0x09
1-2	Bits 0-14: Grid ID number Bit 15: local grid=1; adjacent grid=0
3-5	Grid Origin Latitude: LSB=2^-23 semicircles
6-8	Grid Origin Longitude: LSB=2^-23 semicircles
9-10	Grid Origin Altitude (HAE): LSB=1 meter

Table 15: FM Identification Packet

Byte Number	Description
0	Packet ID: 0x0a
1-2	Bits 0-14: Grid ID number Bit 15: local grid=1; adjacent grid=0
3	Bits 0-1: Transmitter ID Bits 2-3: Number of transmitters (0⇒4 transmitters) Bits 4-7: Spare
4-6	FM Transmitter Latitude: LSB=2^-23 semicircles
7-9	FM Transmitter Longitude: LSB=2^-23 semicircles
10-11	FM Transmitter Altitude (HAE): LSB=1 meter
12	Bits 0-6: Frequency 0⇒87.5MHz, 1⇒87.7MHz, 102⇒107.9MHz Bit 7: Subcarrier: 0⇒67KHz, 1⇒92KHz

Table 16: UHF Identification Packet

Byte Number	Description
0	Packet ID: 0x0b
1-2	Bits 0-14: Grid ID number Bit 15: local grid=1; adjacent grid=0
3	Bits 0-1: UHF Frequency ID Bits 2-3: Number of frequencies (0⇒4 frequencies) Bits 4-7: Spare
4-5	Bits 0-11: Frequency 0⇒450MHz, 1⇒450.0125MHz, 1600⇒470MHz Bits 12-15: Spare

Table 17: GPS Time Packet

Byte Number	Description
0	Packet ID: 0x0c
1-2	Bits 10-15: Leap Seconds Bits 0-9: GPS Week 0-1023
3-5	Bits 0-19: GPS Second 0-604799 Bits 20-23: Rollover Count
6	Bits 0-6: Time Zone Offset from GPS/UTC, LSB=15 minutes Bit 7: Spare

Table 18: Set Main Repeating Interval Slot Definition Packet

Byte Number	Description
0	Packet ID: 0x0d
1- 4	Bits 0-29:Tracker ID Bit 30: entry type flag (0=normal, 1=low power)[1] Bit 31: spare
5 - 6	Network/Interface ID
7	Slot
8-9	Repeating Interval Index
10-11	Interval Length

[1] Tracker modules may enter the network by requesting network entry or by requesting a low power slot with their state and status tracking update. If a tracker requested net entry using a net entry request packet, this flag is 0. If a tracker requested a low power RI slot, this flag is 1.

Table 19: Add Auxiliary Repeating Interval Slot Definition – Single Interval by Tracker ID Packet

Byte Number	Description
0	Packet ID: 0x0e
1-4	Tracker ID
5	Slot
6 - 7	Repeating Interval Index
8 - 9	Interval Length

Table 20: Add Auxiliary Repeating Interval Slot Definition – Single Interval by Network/Interface ID Packet

Byte Number	Description
0	Packet ID: 0x0f
1-2	Network/Interface ID
3	Slot
4 - 5	Repeating Interval Index
6 - 7	Interval Length

Table 21: Add Auxiliary Repeating Interval Slot Definition – Limited Number of Intervals by Tracker ID Packet

Byte Number	Description
0	Packet ID: 0x10
1- 4	Tracker ID
5	Slot
6 - 7	Repeating Interval Index
8 - 9	Interval Length
10	Interval Count

Table 22: Add Auxiliary Repeating Interval Slot Definiti n – Limited Number of Intervals by Netw rk/Interfac 'D Packet

Byte Number	Description
0	Packet ID: 0x11
1 - 2	Network/Interface ID
3	Slot
4 – 5	Repeating Interval Index
6 – 7	Interval Length
8	Interval Count

Table 23: Available Network Entry Slots Packet

# of bytes	Description
1	Packet ID: 0x12
1	Slot Count
(SlotCount+7)/8	Bit map of available slots Flag (0 = not available, 1 = available) Slot 0 Flag = bit 0, byte 2, Slot 1 Flag = bit 1, byte 2, . . . Slot 8 Flag = bit 0, byte 3, Slot 9 Flag = bit 2, byte 3, . . .

Table 24: Repeating Interval Slot Config Info Packet

Byte Number	Description
0	Packet ID: 0x13
1-2	Frame cycle length
3	Self-purge update count
4	Tracker ID Request Mode 0 = Tracker ID Not Required, 1 = Tracker ID required for next update only, 2 = Tracker ID required for all updates
5 - 6	BIT Packet Rate (in seconds)

Table 25: Network Entry Response Packet

Byte Number	Description
0	Packet ID: 0x15
1-4	Tracker ID
5	Bits 0 –1 : Assigned Tracker State Code: 0 = wait for auxiliary repeating interval slot, 1 = wait for net entry permission, 2 = wait for registration[1]

[1] Indicates that the tracker has not been registered with the NDC Server. Unregistered trackers may continue to request network entry each hour.

Table 26: Network Entry Request Permissi n Packet

# of bytes	Descripti
1	Packet ID: 0x16
4 or 1[1]	Bits 0-1: Address Mode 0 = by tracker ID, 1 = by customer ID, 3 = by Tracker ID List Bits 2 - 31: Address (by Tracker ID) Bits 2-25: Customer ID (by customer ID)
2 or Variable[1]	2 bytes: Network/Interface ID (by Network/Interface ID) Variable: Tracker ID List Block (by Tracker ID List)

[1] If address type indicates "by tracker ID" or "by customer ID", the ID follows immediately afterwards. If "by Network/Interface ID" or "by Tracker ID List" is indicated, the ID starts in the next byte.

Table 27: Purge Assigned Repeating Intervals – By Tracker ID, Customer ID, or Tracker ID List Packet

# of bytes	Description
1	Packet ID: 0x17
4 or 1[1]	Bits 0-1: Address Mode 0 = by tracker ID, 1 = by customer ID, 2 = by Network/Interface ID, 3 = by Tracker ID List Bits 2 - 31: Address (by Tracker ID)[3] Bits 2-25: Customer ID (by customer ID)
2 or Variable[1]	2 bytes: Network/Interface ID (by Network/Interface ID) or Variable: Tracker ID List Block (by Tracker ID List) or
1	Bits 0 – 3: 0 = Purge all repeating intervals, 1 = Purge all auxiliary repeating intervals, 2 = Purge main repeating interval[2] 3 = Purge specified repeating interval[4] Bit 4: 0 = Wait for Net Entry Request Permission, 1 = Request Network Entry
1 (optional)[4]	Specified Repeating Interval: Slot[4]
2 (optional)[4]	Specified Repeating Interval: Index[4]
2 (optional)[4]	Specified Repeating Interval: Length[4]

[1] If address type indicates "by tracker ID" or "by customer ID", the ID follows immediately afterwards. If "by Network/Interface ID" or "by Tracker ID List" is indicated, the ID starts in the next byte.
[2] Trackers should purge their Network/Interface ID when their main repeating interval is purged.
[3] 0x0000 = Broadcast tracker ID. If a purge assigned repeating interval is sent to 0x0000, all tracker modules should purge the indicated repeating interval(s).
[4] Optional portion of the message that only exists if "Purge specified repeating interval" is indicated.

Table 28: Message Response Acknowledge

# of bytes	Description
1	Packet ID: 0x18
1	Bits 0-2: Response Key ID 1 = Softkey #1, 2 = Softkey #2, 3 = Softkey #3,4 = Softkey #4 Bits 3-4: Address Mode 0=Tracker ID, 1= Network/Interface ID Bit 5-7: Spare
3	Message Sequence ID[1] (unique for each customer)
Variable	Tracker ID (4 bytes), Network/Interface ID (2 bytes)

[1] The Message Sequence ID is the same ID associated with the original text/site dispatch message that required the response.

Table 29: Site Dispatch Message

# of bytes	Description
1	Packet ID: 0x19
1	Bits 0-2: Response Set[1] (predefined set of response choices) Bit 3-4: Address Mode 0= Tracker ID, 1 = Network/Interface ID, 2 = Customer ID Bits 5-6: Site Type[3] (0=job site, 1=home base, 2= customer defined, 3 = customer defined) Bit 7: spare
3	Message Sequence ID (unique for each customer)
Variable	Tracker ID (4 bytes), Network/Interface ID (2 bytes), Customer ID (3 bytes)
3	Send Time (GPS Second)
3	Site ID (unique per type per customer)[4]
3	Northeast Latitude -90° to +90° (LSB = 180° * 2^{-23})
3	Northeast Longitude -180° to +180° (LSB = 180° * 2^{-23})
3	Southwest Latitude -90° to +90° (LSB = 180° * 2^{-23})
3	Southwest Longitude -180° to +180° (LSB = 180° * 2^{-23})
1	Message Length (L_1) (Max = 128 bytes, including response)[5]
L_1	Message[2]

[1] See the Pre-defined Message Response Sets table for more information.

Table 30: Site Purge Message

# of bytes	Description
1	Packet ID: 0x1c
1	Bits 0-2: Response Set[1] (predefined set of response choices) Bit 3-4: Address Mode 0= Tracker ID, 1 = Network/Interface ID, 2 = Customer ID Bits 5-6: Site Type[3] (0=job site, 1=home base, 2= customer defined, 3 = customer defined) Bit 7: spare
3	Message Sequence ID (unique for each customer)
Variable	Tracker ID (4 bytes), Network/Interface ID (2 bytes), Customer ID (3 bytes)
3	Send Time (GPS Second)
3	Site ID (unique per type per customer)[2]

[1] See the Pre-defined Message Response Sets table for more information.

[2] Site ID values are unique per customer per site type, except for the mass purge Site ID of 0x1FFFFF. The Site ID 0x1FFFFF tells the tracker to purge all messages of the type indicated in the Site Type field.

[3] The tracker module may use the site type to determine the length of time a site should be retained and the algorithm that should be used to determine arrival/departure status. Job sites should be retained by the tracker until the tracker enters and leaves the site. Home base sites should be retained until deleted. And, types 2 & 3 should be retained based on customer defined rules.

Table 31: User Data Ackn wledge

# of bytes	Description
1	Packet ID: 0.
1	Bits 0: Address Mode 0=Tracker ID, 1= Network/Interface ID Bit 1-7: spare
1	User Data Sequence ID[1]
Variable	Tracker ID (4 bytes), Network/Interface ID (2 bytes)

[1] Sequence ID assigned by tracker when reliable user data packet was transmitted. See Reliable User Data and Reliable Short User Data for more information.

Table 32: Grid ID Packet2

# of bytes	Description
1	Packet ID: 0x1b
2	Bits 0-14: Grid ID number Bit 15: local grid=1; adjacent grid=0
3	Grid Origin Latitude: LSB=2^{-23} semicircles
3	Grid Origin Longitude: LSB=2^{-23} semicircles
2	Grid Origin Altitude (HAE): LSB=1 meter
2	NDC Server Boot Sequence ID

Table 33: Site Status Acknowledge

# of bytes	Description
1	Packet ID: 0x1d
1	Bits 0: Address Mode 0=Tracker ID, 1= Network/Interface ID Bits 1-2: Site Type[3] (0=job site, 1=home base, 2= customer defined, 3 = customer defined) Bit 3-7: spare
Variable	Tracker ID (4 bytes), Network/Interface ID (2 bytes)
3	Site ID
1	Site Sequence ID[1]

[1] Sequence ID assigned by tracker when reliable site status packet was transmitted. See Site Status for more information.

Table 34: Planned Tracker Update Repeating Interval Rates

Transmit Interval (sec)	Transmit Interval (min)	Comments
3600	60	Low power repeating interval
1800	30	
1200	20	
900	15	12 hrs/day, 1000 updates/month
600	10	8 hrs/day, 1000 updates/month
300	5	
225	3.75	12 hrs/day, 4000 updates/month
144	2.4	8 hrs/day, 4000 updates/month
60	1	
30	0.5	
10	0.166667	
5	0.083333	Emergency Vehicles

Table 35: Tracker State L ͟ Block Byte/Bit Definiti ns

Byte/Bit, Bit Length	Description
0/0, 10	Grid Zone ID
1/2, 24	Bits 0-10: ΔN_{off} Bits 11-21: ΔE_{Off} Bit 22: State Data Validity 1=valid Bits 23: GPS Validity 1=DGPS current
4/2, 7	Bits 0-6: Speed
5/1, 7	Bits 0-6: Heading

Table 36: Reduced State Data Block Byte/Bit Definitions

Byte/Bit, Bit Length	Description
0/0, 10	Grid Zone ID
1/0, 24	Bits 0-10: ΔN_{off} Bits 11-21: ΔE_{Off} Bit 22: State Data Validity 1=valid Bits 23: GPS Validity 1=DGPS current

Table 37: Network Status Code Definitions

Code	Description
0	No status
1	Network exit request
2	Low Power Repeating Interval Slot Request
3	Low Power exit request
4	All Repeating Interval Slots Purged
5	Main Repeating Interval Slot Purged
6	Auxiliary Repeating Interval Slot Purged
7	Re-assign Main Repeating Interval Slot Request
8	Re-assign Auxiliary Repeating Interval Slot Request
9-31	

Table 38: Message Acknowledgement/Response Block

Byte/Bit, Bit Length	Description
0/0, 1	Acknowledgement/Response Flag (0 = Ack Only, 1 = Response)
0/1, 3	Response Key ID (0=Return Receipt[2], 1= Softkey #1, 2 = Softkey #2, 3 = Softkey #3, 4 = Softkey #4)
0/4, 1	spare
0/5, 21	Message/Site Sequence ID
3/2, 20	GPS Second Receipt/Response Time[1]

[1] Indicates the GPS Second when the message was received for acknowledgment or the GPS Second when the Softkey was pressed for a response.

[2] Indicates that message was read by driver.

Tabl 39: Tracker Pack Summary

Description	ID Number	Comments	Spare Bits
Net Entry Request	0	Used to request main RI Slot or a one-time auxiliary RI Slot.	14
State and Status	1	Normal Periodic Transmission	1
Reliable User Data	2	User Specific	4
Short State and Status	3	Contains Tracker ID	3
Reliable Short User Data	4	User Specific with Tracker ID	6
Reduced State User Data and Status	5	State, Tracker ID, and User Data	3
Message Response and User Data	6	Message response with user data.	6
Short Message Response and User Data	7	Message response with full tracker ID and user data.	0
Site Status	8	Used to indicate job site arrival/departure	2
Built-in test (BIT)	9	Packet to provide info about the tracker, it's environment and the RF network.	Varies by type.
Pre-defined Message Definition Request	0x0a	Used by tracker to request a pre-defined message definition. NOTE: This packet may be sent in a network entry slot.	0

Table 40: Net Entry Request Packet Bit Definitions

Byte/Bit,bit length	Bit Number	Description
0/0, 4	0-3	Packet ID Block (0x00)
0/4, 1	4-4	0 = Main RI Slot, 1 = Single Auxiliary RI Slot
0/5, 1	5-5	0 = Main RI Slot, 1 = Single Auxiliary RI Slot
0/6, 30	6-35	Bits 0-29: Tracker ID Number
4/4, 30	36-65	Bits 0-29: Tracker ID Number
8/2, 5	66-70	Aux Interval Count
8/7, 5	71-75	Aux Interval Count
9/4, 4	76-79	Spare
10/0, 16	80-95	CRC 16

Table 41: State and Status Packet Bit Definitions

Byte/Bit, bit length	Bit Number	Description
0/0, 4	0-3	Packet ID Block (0x01)
0/4, 5	4-8	Network Status Code
1/1, 48	9-56	Tracker State Data Block
7/1, 24	57-80	User Data Block
10/1,7	81-87	Spare
11/0, 8	88-95	CRC 8

Table 42: Reliable User Data Packet Bit Definitions

Byte/Bit,bit length	Bit Number	Description
0/0, 4	0-3	Packet ID Block (0x02)
0/4, 8	4-11	User Data Sequence ID
1/4, 72	12-83	User Data Block
10/4, 4	84-87	Spare
11/0,8	88-95	CRC 8

Table 43: Short State and Status Packet Bit Definitions

Byte/Bit,bit length	Bit Number	Description
0/0, 4	0-3	Packet ID Block (0x03)
0/4, 30	4-33	Bits 0-29: Tracker ID Number
4/2, 5	34-38	Network Status Code
4/7, 48	39-86	Tracker State Data Block
10/5, 1	87-87	Spare
11/0, 8	88-95	CRC 8

Table 44: Reliable Short User Data Packet Bit Definitions

Byte/Bit,bit length	Bit Number	Description
0/0, 4	0-3	Packet ID Block (0x04)
0/4, 30	4-33	Bits 0-29: Tracker ID Number
4/2, 8	34-41	User Data Sequence ID
5/2, 40	42-81	User Data
10/2, 6	82-87	Spare
11/0, 8	88-95	CRC 8

Table 45: Reduced State User Data and Status Packet Bit Definitions

Byte/Bit,bit length	Bit Number	Description
0/0, 4	0-3	Packet ID Block (0x05)
0/4, 30	4-33	Bits 0-29: Tracker ID Number
4/2, 5	34-38	Network Status Code
4/7, 34	39-72	Reduced State Data Block
8/7, 8	73-80	User Data
10/7, 7	81-87	Spare
11/0, 8	88-95	CRC 8

Table 46: Message Response and User Data Packet Bit Definitions

Byte/Bit,bit length	Bit Number	Description
0/0, 4	0-3	Packet ID Block (0x06)
0/4, 46	4-49	Message Acknowledgement/Response Block
6/2, 32	50-81	User Data Block
10/2, 6	82-87	Spare
11/0, 8	88-95	CRC 8

Table 47: Short Message Response and User Data Packet Bit Definitions

Byte/Bit,bit length	Bit Number	Description
0/0, 4	0-3	Packet ID Block (0x07)
0/4, 30	4-33	Bits 0-29: Tracker ID Number
4/2, 46	34-79	Message Acknowledgement/Response Block
10/0, 8	80-87	User Data Block
11/0, 8	88-95	CRC 8

Table 48: Site Status Packet Bit Definitions

Byte/Bit,bit length	Bit Number	Description
0/0, 4	0-3	Packet ID Block (0x08)
0/4, 30	4-33	Bits 0-29: Tracker ID Number
4/2, 2	34-35	Site Type (0=job site, 1=home base, 2= customer defined, 3 = customer defined)
4/2, 21	36-56	Site ID
7/0, 1	56-56	Status (0 = Arrival, 1 = Departure)
7/1, 1	57-57	Automatic Source Flag[2]
7/2, 1	58-58	User Source Flag[3]
7/2, 20	59-79	GPS Second Arrival/Departure Time[1]
9/6, 8	80-87	Site Status Sequence ID
11/0, 8	88-95	CRC 8

[1] Indicates the GPS Second value upon arrival/departure.
[2] Set for "event-driven" initiated event.
[3] Set for user initiated event.

Table 49: Built-in Test (BIT) Packet Bit Definitions

Byte/Bit,bit length	Bit Number	Description
0/0, 4	0-3	Packet ID Block (0x09)
0/4, 4	4-7	BIT Packet Type
1/0, 80		BIT Packet Data Block[1]
11/0, 8	88-95	CRC 8

[1] See following tables for the BIT Packet Data Blocks.

Table 50: Built-in Test (BIT) Packet Data Block (Network and RF System, Type = 0)

# of bytes	Description
2	Missed Bit Sync Count
2	CRC Error Count A
2	CRC Error Count B
1	Number of Times Sync Was Lost
1	Max Sync Loss Duration
1	Number of Network Entry Attempts
1	Number of Reliable Packet Retries

Table 51: Built-in Test (BIT) Packet Data Block (Vehicle and Environment, Type = 1)

# of bytes	Description
1	Highest Batte. Voltage
1	Lowest Battery Voltage
1	Number of Times Ignition Was Turned Off
1	Shortest Off Duration (min)
1	Longest Off Duration (min)
1	Highest Temperature (°C)
1	Lowest Temperature (°C)
3	Spare (0x000000)

Table 52: Built-in Test (BIT) Packet Data Block (Navigation, Type = 2)

Byte/Bit, bit length	Bit Number	Description
0/0, 8	0-7	Number of Times Nav was Invalid
1/0, 8	8-15	Maximum Duration Nav was Invalid (min)
2/0, 8	16-23	Number of Times without DGPS
3/0, 8	24-31	Maximum Duration without DGPS (min)
4/0, 4	32-35	Number of SVs tracked
4/4, 5	36-40	SNR for Channel 0
5/1, 5	41-45	SNR for Channel 1
5/6, 5	46-50	SNR for Channel 2
6/3, 5	51-55	SNR for Channel 3
7/0, 5	56-60	SNR for Channel 4
7/5, 5	61-65	SNR for Channel 5
8/2, 5	66-70	SNR for Channel 6
8/7, 5	71-75	SNR for Channel 7
9/4, 4	76-79	Spare

Table 53: Built-in Test (BIT) Packet Data Block (Version, Type = 3)

# of bytes	Description
1	Tracker Software Major Release
1	Tracker Software Minor Release
1	Tracker Software Build
1	Tracker Hardware Major Release
1	Tracker Hardware Minor Release
1	MDT Software Major Release
1	MDT Software Minor Release
1	MDT Software Build
1	MDT Hardware Major Release
1	MDT Hardware Minor Release

Table 54: Built-in Test (BIT) Packet Data Block (Ready Mix, Type = 4)

# of bytes	Description
2	Number of times wash out hose was on for 15 minutes continuously
2	Number of times water was turned on
2	Number of times door was opened
2	Number of times drum was charged
2	Number of times drum was discharged

Table 55: Pre-Defined Message Definition

Byte/Bit,bit length	Bit Number	Description
0/0, 4	0-3	Packet ID Block (0x0A)
0/4, 30	4-33	Bits 0-29: Tracker ID Number
4/2, 30	34-63	Bits 0-29: Tracker ID Number
8/0, 8	64-71	Pre-defined Message ID
9/0, 8	72-79	Pre-defined Message ID
10/0, 16	80-95	CRC 16

Table 56: TPU Channels and Functions

Channel	Signal	Input From	Output To	Linked To	Priority	TPU Function	Mode	Purpose
TP0	TX Key		TP1		L	OC	Host Initiated Pulse	Turn on transmitter
TP1	TX Timing	TP0		TP2	L	ITC	Single Shot/Link(1)	Start TX serial clock at correct time
TP2	RF Serial Clk		SCLK, TP3		H	OC	Continuous Pulse	TX serial bit clock to QSPI
TP3	RF Serial Clk	TP2		TP2	H	ITC	Single Shot/Link(1)	Count transmitted bits
TP4	RX Data A	Rcv FM Data A			M	PPWA	Pulse Accum/No Link	Detect bit-sync pulses, alt. TP11
TP5	RX Timing 1		TP6		L	OC	Host Initiated Pulse	Initiate FM data reception
TP6	RX Timing 2	TP5		TP7, TP8	L	ITC	Single Shot/Link(2)	Start RX serial clocks at correct time
TP7	Shift Clk		Shift Reg		H	OC	Continuous Pulse	RX bit clock
TP8	Latch Clk		Shift Reg		M	OC	Continuous Pulse	RX byte clock, interrupt to rcv byte
TP9								Used for RAM
TP10								Spare: may need for RAM
TP11	RX Data B	Rcv FM Data B			M	PPWA		Detect bit-sync pulses, alt. TP04
TP12	Direction	External			L	ITC		Detect direction change
TP13	Wheel Sens A	External			L	QDEC		Count wheel sensor pulses
TP14	Wheel Sens B	External			L	QDEC		Count wheel sensor pulses
TP15	Cruise Sens	External			L	ITC	Single Shot/No Link	Count speed sensor pulses
TP11	PPS	GP2021/Extern.						Roof Module Receiver

Table 57: Navigation Data

Word Number	Description	Type	Units/ LSB	Range
1-5	Header			
6	Status			
7-8	Latitude	Long	2^{-31} semicircles	±0.5
9-10	Longitude	Long	2^{-31} semicircles	±1.0
11	Altitude	Short	0.125m	
12	North Velocity	Short	2^{-8} m/sec	
13	East Velocity	Short	2^{-8} m/sec	
14	Down Velocity	Short	2^{-8} m/sec	
15	Year	Ushort		
16(lsb)	Month	Uchar		1-12
16(msb)	Day	Uchar		1-31
17(lsb)	Hour	Uchar		0-23
17(msb)	Minute	Uchar		0-59
18	Second	Ushort	2^{-7} sec	0-7679
19	Data Checksum			

Table 58: Received Message Data (7102)

Word Number	Description	Type	Units/LSB	Range
1-5	Header			
6(lsb)	Message Type 1=canned, 2=full text	uchar		
6(msb)	Canned ID/Text Length(L)	uchar		
7(lsb)	IOD	uchar		0-255
7(msb)	User Response	uchar		0-4
8	Year	ushort		
9(lsb)	Month	uchar		1-12
9(msb)	Day	uchar		1-31
10(lsb)	Hour	uchar		0-23
10(msb)	Minute	uchar		0-59
11(lsb)	Number of valid responses	uchar		0-4
11(msb)	Spare	uchar		
12-16	Response 1 Text	char		
17-21	Response 2 Text	char		
22-26	Response 3 Text	char		
27-31	Response 4 Text	char		
next L/2	Text if type=2, padded with 0 in last byte if L is odd	char		

Table 59: Received User Data (7103)

Word Number	Description	Type	Units/LSB	Range
1-5	Header			
6	Data Type Identifier	ushort		0-255
7-16	20 Data bytes	uchar		

Table 60: Available Message Data (7104)

Word Number	Description	Type	Units/LSB	Range
1-5	Header			
6	Number of unread messages (X)	ushort		0-255
7	Id of most recent unread message	ushort		0-255
...	...	...	...	...
7+X-1	Id of oldest unread message	ushort		0-255
7+X	Number of saved messages (Y)	ushort		0-255
7+X+1	Id of most recent saved message	ushort		0-255
...	...	...	...	...
7+X+Y-1	Id of oldest saved message	ushort		0-255
7+X+Y	Data Checksum			

Table 61: User Data Mes e List (7106)

Word Number	Description	Type	Units/ LSB	Range
1-5	Header			
6	Number of messages in the list (N)	ushort		0-255
7-21	Message 1	char		0-255
...	...	...	...	...
(7+N*15)-(21+N*15)	Message N	char		0-255
7+N*15	Data Checksum			

Table 62: Data Request (7201)

Word Number	Description	Type	Units/ LSB	Range
1-5	Header			
6	Message ID	ushort		
7	On/Off	ushort		
8	Data Checksum			

Table 63: Text Message Response (7202)

Word Number	Description	Type	Units/ LSB	Range
1-5	Header			
6(lsb)	IOD	uchar		0-255
6(msb)	Response	ushort		0-7
7	Data Checksum			

Table 64: User Data Output (7203)

Word Number	Description	Type	Units/ LSB	Range
1-5	Header			
6(lsb)	Number of Bytes	uchar		1 or 9
6(msb)	Data Type Identifier	uchar		0-255
7-11	10 Data bytes (1 or 9 will be used)	uchar		
12	Data Checksum			

Table 65: Request Available Message Data (7204)

Word Number	Description	Type	Units/ LSB	Range
1-5	Header			

Table 66: Request Message (7205)

Word Number	Description	Type	Units/ LSB	Range
1-5	Header			
6	Message Identifier	ushort		0-255
7	Data Checksum			

Table 67: Request User Data Message List (7206)

Word Number	Description	Type	Units/ LSB	Range
1-5	Header			

Table 69: NTCC/SCC Message Summary

Message ID	Source	Description	Rate
1101	NTCC	Timing Control	1Hz
1102	NTCC	Transmit Data Frame (1 of N)	N frames at 1Hz
1201	SCC	SCC Status	1Hz

Table 70: Timing Control (1101)

Word Number	Description	Type	Units	Range
1-5	Header			
6(lsb)	Timing Control Mode	uchar		0-2
6(msb)	Control Type	uchar		0-2
7-8	Timer Control	long	0.1 microsec	±0.5 sec
9	Data Checksum			

Table 71: Transmit Data Frame (1102)

Word Number	Description	Type	Units	Range
1-5	Header			
6	Broadcast Frame ID	short		0-188
7(lsb)	Frame Number (n)	uchar		0-?
7(msb)	Total Number of Frames (N)	uchar		0-?
8	Number of Bytes per Frame (l)	short		
9-8+(l+1)/2	Frame Data Bytes	uchar		
9+(l+1)/2	Data Checksum			

Table 72: SCC Status (1201)

Word Number	Description	Type	Units	Range
1-5	Header			
6-7	Current Nominal Timer	long	0.1 microsec	0-1.0+ sec
8	SCC Status	coded		
9	Data Checksum			

Table 73: NTCC/Server Message Summary

Message ID	Source	Description	Rate
2104	Server	Login Info Request	At Initialization
2304	NTCC	Login Info Response	At Initialization
2105	Server	NTCC Profile Request	At Initialization
2305	NTCC	NTCC Profile Response	At Initialization
2103	NTCC	Status 2	1Hz
2201	Server	FM Data	At Connection
2202	Server	Vehicle Packet	High Rate
2203	Server	Local Time Zone Offset	At Initialization and once per hour

Table 74: Login Info Request Message (2104)

# of bytes	Description	Value or Range
10	Header	

Table 75: Login Info Response Message (2304)

# of bytes	Description	Value or Range
10	Header	
2	User ID Length	0x0000 – 0x0020
L_1	User ID	
2	Password Length	0x0000 – 0x0020
L_2	Password	
Padding[1]		
1	Data Checksum	

[1] 0x00 will be used for padding if necessary to make entire body word aligned.

Table 76: NTCC Profile Request Message (4105)

# of bytes	Description	Value or Range
10	Header	

Table 77: NTCC Profile Response Message (4305)

# of bytes	Description	Value or Range
10	Header	
4	NTCC Serial Number	
4	Roof Module Serial Number	
2	Data Checksum	

[1] 0x00 will be used for padding if necessary to make entire body w rd aligned.

Table 78: Status Message 2 (2103)

# of bytes	Description	Value r Range
10	Header	
2	Timing Status	0= No Sync 1= In Sync
2	Week Roll-over Count	
2	Leap Seconds	
2	GPS Week	
4	GPS Second	
2	Current Network Frame Number	
1	System Status Mode	1=Init, 2=Sync, 3=Run
1	Bits 0-3: Timing Mode Bits 4-7: Timing Sub Mode	Bits 0-3: 0=Init, 1=Coarse Offset, 2=Coarse Rate, 3=Fine Rate Bits 4-7: 0=Sample, 1=Wait, 2=Command, 3=Check
1	Bits 0-3: GPS Status Bits 4-7: System Time Status	Bits 0-3: 0=Waiting For GPS,1=GPS Initialized Bits 4-7: 0=Invalid, 1=Valid
2	SCC Clock Rate	LSB=0.1 PPM
1	Bits 0-3: SCC Port Status Bits 4-7: SCC Port Connection Status	Bits 0-3: 0=Inactive, 1=Active Bits 4-7: 0=Not Connected, 1=Connected
4	Sync Loss Events	
4	Total Sync Loss Time	
1	NDC Port	0=Inactive, 1=Active
1	Bit 0: Roof Module Status Bits 1-2: Roof Module Channel Status Bit 3: FM Sync Bit 4: FM Sync Message Bits 5-7: spare	Bit 0: 0 = Inactive, 1 = Active Bits 1-2: 0 = No Frequency Date, 1 = Not Locked, 2 = Locked Bit 3: 0 = Unreliable, 1 = Reliable Bit 4: 0 = Unreliable, 1 = Reliable Bits 5-7: 0
1	FM Bit Sync Reliability	LSB=1%
1	Sync Data Status	0=Unreliable, 1=Reliable, 2=Timed out
1	Sync Data Reliability	LSB=1%
1	Bits 0-3: GPS CDU Port Bits 4-7: PPS	Bits 0-3: 0=Inactive, 1=Active Bits 4-7: 0=Invalid, 1=Valid
1	GPS SVID Count (C_1)	0-12
1	GPS SVID #0	
...		
1	GPS SVID #(C_1-1)	
1	GPS CN0 Count (C_2)	0-12
1	GPS CN0 #0	
...		
1	GPS CN0 #(C_2-1)	
1	Bits 0-3: RTCM Port Bits 4-7: Data	Bits 0-3: 0=Inactive, 1=Active Bits 4-7: 0=Unavailable, 1=Available
1	RTCM T1 SVID Count (C_3)	0-12
2 (if C_3 >	RTCM T1 Frame Number	0-3599

Table 78 (continued)

0)		Note: T1 Frame Number not supplied if C_3 = 0.
1	RTCM T1 SVID #0	
...		
1	RTCM T1 SVID #(C_3-1)	
1	RTCM T2 SVID Count (C_4)	0-12
2 (if C_4 > 0)	RTCM T2 Frame Number	0-3599 Note: T2 Frame Number not supplied if C_4 = 0.
1	RTCM T2 SVID #0	
...		
1	RTCM T2 SVID #(C_4-1)	
2	FM Error Frame	
2	FM Error Count	
2	FM Bit Count	
4	FM Total Error Count	
4	FM Total Bit Count	
4	Bert PPM	LSB = .001 PPM
2	Total Bytes Sent on Last Frame	short
2	Free Bytes After Last Frame	short
2	Packets Received	short
2	Packet Bytes Received	short
2	Packets Sent	short
2	Packet Bytes Sent	short
2	Packets in Queue	short
2	Packet Bytes in Queue	short
Padding[1]		
1	Data Checksum	

Table 79: FM Data (2201)

Word Number	Description	Type	Units	Range
1-5	Header			
6	Frequency	short	0.1 MHz	875-1079
7	Subcarrier	short	kHz	67 or 92
8-9	Latitude	long	2^{-31} semicircles	−1 to 1
10-11	Longitude	long	2^{-31} semicircles	−0.5 to 0.5
12	Altitude	short	meters	
13-27	Telephone Number String	char		
28	Data Checksum			

Table 80: Vehicle Packet (2202)

Word Number	Description	Type	Units	Range
1-5	Header			
6	Vehicle Data Length (l)	short	bytes	
7-6+(l+1)/2	Packet Contents			
7+(l+1)/2	Data Checksum			

Table 81: L cal Time Zo Offset (2203)

Word Number	Description	Type	Units	Range
1-5	Header			
6	Time Zone Offset	short	LSB = 15 min	-48 to 48
7	Data Checksum			

Table 82: NTCC/Roof Module Message Summary

Message ID	Source	Description	Rate
3101	NTCC	Frequency Control	At Initialization
3102	NTCC	Time/Status	1Hz
3201	Roof Module	Status	1Hz
3202	Roof Module	Received FM Data	1Hz
3203	Roof Module	Timing	1Hz

Table 83: Frequency Control (3101)

Word Number	Description	Type	Units	Range
1-5	Header			
6	Frequency	short	0.1 MHz	875-1079
7	Subcarrier	short	KHz	67 or 92
8	Data Checksum			

Table 84: Time/Status (3102)

Word Number	Description	Type	Units	Range
1-5	Header			
6	Timing Status	coded		
7	GPS Week	short		0-1023
8-9	GPS Second	long		0-604799
10	Current Network Frame Number	short		0-188
11	Mode	coded		
12	System Status	coded		
13	Data Checksum			

Table 85: Status (3201)

Word Number	Description	Type	Units	Range
1-5	Header			
6	Frequency	short	0.1 MHz	875-1079
7	Subcarrier	short	kHz	67 or 92
8	Timing Status	coded		
9	System Status	coded		
10	FM Status	coded		
11	Data Checksum			

Table 86: Received FM Data (3202)

Word Number	Description	Type	Units	Range
1-5	Header			
6	Frame Number	short		0-188
7	Number of Bytes (*l*)	short		
8-7+(*l*+1)/2	Data Bytes	uchar		
8+(*l*+1)/2	Data Checksum			

Table 87: Timing (3203)

Word Number	Description	Type	Units	Range
1-5	Header			
6	GPS Week	short		0-1023
7-8	GPS Second	long		0-604799
9-10	Delay to Sync	long	0.1 microsec	0-1 sec
11	Data Checksum			

Table 88: Standard Message Format

Message Section	# of words	Description	Value or Range
Header	1	Message Start Word	0x81FF
	1	Standard Message Type ID	
	1	Data Word Count (N)	
	1	Flags	0xXX00
	1	Header Checksum	
Data (Optional)	1	Data Word #1	
	...		
	1	Data Word #N	
	1	Data Checksum	

Table 89: Standard Message Header Format

Message Section	# of words	Description	Value or Range
Header	1	Messag Start Word	0x81FF
	1	Standard Message Type ID	
	1	Data Word Count (N)	
	1	Flags/Message ID	0xXX00
	1	Header Checksum	

Tabl 90: Message Type Range – NDC Server

Software Comp nent with an Interface to NDC Server	Directi n/purpose	Reserved Message ID Range
NTCC	From NDC Server	2100 – 2199
	T NDC Server	2200 – 2299
	Response to NDC Server initiated message	2300 – 2399
	Response to NTCC initiated message	2400 – 2499
Network Hub	From NDC Server	4100 – 4199
	To NDC Server	4200 – 4299
	Response to NDC Server initiated message	4300 – 4399
	Response Network Hub initiated message	4400 – 4499
NDC Command Station	From NDC Server	5100 – 5199
	To NDC Server	5200 – 5299
	Response to NDC Server initiated message	5300 – 5399
	Response to NDC Command Station initiated message	5400 – 5499
DMCS	From NDC Server	7100 – 7199
	To NDC Server	7200 – 7299
	Response to NDC Server initiated message	7300 – 7399
	Response to DMCS initiated message	7400 – 7499

Table 91: Message Type ID Range - DMCS

Software Component with an Interface to DMCS	Direction/purpose	Reserved Message ID Range
CCS	From DMCS	6100 – 6199
	To CCS	6200 – 6299
	Response to DMCS initiated message	6300 – 6399
	Response to CCS initiated message	6400 – 6499

Table 92: Standard Message Data Section

Message Section	# of words	Description	Value or Range
Optional data section	1	Data Word #1	
	...		
	1	Data Word #N	
	1	Data Checksum	

Table 93: Login Info Request Message (7101)

# of bytes	Description	Value or Range
10	Header	

Table 94: Login Info Response Message (7301)

# of bytes	Description	Value or Range
10	Header	
2	User ID Length (L₁)	0x0000 – 0x0010
L₁	User ID	
2	Password Length (L₂)	0x0000 – 0x0010
L₂	Password	
Padding[1]		
2	Data Checksum	

[1] 0x00 will be used for padding if necessary to make entire body word aligned.

Table 95: Login Info Re   se Result Message (7501)

# of bytes	Description	Value or Range
10	Header	
2	Result	0x0000 = SUCCESS, 0x0001 = Invalid User Name/Password, 0x0002 = Add Connection Failure, 0x0003 = Database Access Error
2	Data Checksum	

Table 96: Message Timeout Message (7107)

# of bytes	Description	Value or Range
10	Header	
3	Message Sequence ID	
2	Number of Trackers N_1[1]	$0x0000 - 0x0800^5$
4	Tracker ID #1	0x00000000 – 0x03FFFFFF
...		
4	Tracker ID #N_1	0x00000000 – 0x03FFFFFF
1	Padding	0x00
2	Data Checksum	

[1] The number of tracker modules that failed to acknowledge the message before the timeout. If the message was sent to all trackers associated with the customer, this number will indicate the trackers that have not yet responding to the message.

Table 97: NDC Command Message (7102)

# of bytes	Description	Value or Range
10	Header	
2	NDC Command Station User Name Length (L_1)	0x0000 – 0x0020
L_1	NDC Command Station User Name	
2	Message Length (L_2)	0x0000 – 0x0100
L_2	Message	
2	NDCS Command Sequence ID[1]	0x0000 – 0xFFFF
Padding[2]		
2	Data Checksum	

[1] Response should use this ID value.
[2] 0x00 will be used for padding if necessary to make entire body word aligned.

Table 98: NDC Command Response Message (7302)

# of bytes	Description	Value or Range
10	Header	
2	NDCS Command Sequence ID[1]	0x0000 – 0xFFFF
2	Status	0x0000 = Success/Forwarded to Customer Command Stations(s), 0x0001 = No Customer Command Stations connected.
2	Data Checksum	

[1] Response should use the same ID sent with the request message.

Table 99: Real-time Tracking Data Message (7103)

# of bytes	Description	Value or Range
10	Header	
2	Year[2]	
1	Month[2]	1 – 12
1	Day[2]	1 – 31
1	Hour[2]	0 – 23
1	Minute[2]	0 – 59
1	Second[2]	0 – 59
2	Tracking Sequence Value[3]	0x0000 – 0xFFFF
2	Type ID[1]	0x0000 – 0x0004
1	Tracker Low Power Mode Flag[5]	0 = not low power, 1 = low power
4	Tracker ID	0x00000000 – 0x3FFFFFFF
Variable	Tracking Data Message[1]	
Padding[4]		
2	Data Checksum	

[1] See Real-time Tracking Data Message Format table.

[2] Date/Time values indicate when the NDC Server received the message and are specified using Greenwich Mean Time (GMT).

[3] The NDC Server maintains a tracking sequence counter for each vehicle. This counter is used to assign tracking sequence values to messages sent from a vehicle to the NDC Server. Message sequence values may be used by CCS applications to determine if any messages are missing from a set of vehicle tracking messages.

NOTE: Tracking sequence values for each tracker rollover every 65536 updates.

[4] 0x00 will be used for padding if necessary to make entire body word aligned.

[5] This flag indicates if the tracker is currently in low power mode. When trackers enter low power mode, they request a low power update slot in the RF network. The low power update rate is less frequent (1 hour) than most tracker update rates. As a result, trackers may power down between updates to conserve their vehicle's battery. Trackers in low power mode will not be able to provide immediate acknowledgement to messages. Messages sent to trackers in this mode will be queued by the NDC Server until the message is acknowledged or the message reaches its timeout.

Table 100: Real-time Tracking Data Message Format

Type ID	Name	# of bytes	Description	Value or Range
0x0001	State	4	Latitude[1]	-90° to +90° (LSB = 180° * 2^{-31})
		4	Longitude[1]	-180° to +180° (LSB = 180° * 2^{-31})
		1	Speed	0x00 – 0x7F (LSB = 0.5 m/s ≈ 1.1 mph)
		1	Heading	-180° to +180° (LSB = 360° * 2^{-7} = 2.8125°)
		3	User Data Block	
		1	Spare	7 spare bits are available
0x0002	Reliable User Data	9	User Data Block	
		1	Spare	
0x0003	Short State	4	Latitude[1]	-90° to +90° (LSB = 180° * 2^{-31})
		4	Longitude[1]	-180° to +180° (LSB = 180° * 2^{-31})
		1	Speed	0x00 – 0x7F (LSB = 0.5 m/s ≈ 1.1 mph)
		1	Heading	-180° to +180° (LSB = 360° * 2^{-7} = 2.8125°)
		1	Spare	1 spare bit is available
0x0004	Reliable Short User Data	5	User Data	
		1	Spare	
0x0005	Reduced State and User Data	4	Latitude[2]	-90° to +90° (LSB = 180° * 2^{-31})
		4	Longitude[2]	-180° to +180° (LSB = 180° * 2^{-31})
		1	User Data	
		1	Spare	7 spare bits are available
0x0006	Message Response and User Data	1	Ack/Response Flag	0 = Acknowledge only, 1 = Response
		1	Response Key ID	0 = Acknowledge only/Return Receipt[6] 1 = Softkey #1, 2 = Softkey #2, 3 = Softkey #3, 4 = Softkey #4
		3	Message Sequence/ Site ID[5]	
		2	GMT Year[3]	
		1	GMT Month[3]	1 – 12
		1	GMT Day[3]	1 – 31
		1	GMT Hour[3]	0 – 23
		1	GMT Minute[3]	0 – 59
		1	GMT Second[3]	0 – 59
		4	User Data	
		1	Spare	6 spare bits are available
0x0007	Short Message Response and User Data	1	Ack/Response Flag	0 = Acknowledge only, 1 = Response

Table 100 (continued)

		1	Response Key ID	0 = A knowledge only/Return Receipt[6]
				1 = S key #1,
				2 = Softkey #2,
				3 = Softkey #3,
				4 = Softkey #4
		3	Message Sequence/ Site ID[5]	
		2	GMT Year[3]	
		1	GMT Month[3]	1 – 12
		1	GMT Day[3]	1 – 31
		1	GMT Hour[3]	0 – 23
		1	GMT Minute[3]	0 – 59
		1	GMT Second[3]	0 – 59
		1	User Data	
0x0008	Site Status	3	Site ID[4]	
		1	Status	0 = Arrival, 1 = Departure
		1	Status Source	1 = GPS, 2 = User, 3 = GPS and User
		2	GMT Year[3]	
		1	GMT Month[3]	1 – 12
		1	GMT Day[3]	1 – 31
		1	GMT Hour[3]	0 – 23
		1	GMT Minute[3]	0 – 59
		1	GMT Second[3]	0 – 59
		1	User Data	
		1	Spare	

[1] ± 4 meters of resolution

[2] ± 8 meters of resolution

[3] Time of receipt for acknowledgements and time when Softkey was pressed for a response.

[4] This Site ID is the same ID associated with the Site Dispatch message. See Send Site Dispatch for more information.

[5] Message sequence ID associated with a text or pre-defined message. Or, site ID associated with a site dispatch message. See "Send Message Response Message", "Send Pre-defined Message ID Response Message ", or "Send Site Dispatch" for more information.

[6] If ack/response flag is 0, 0 indicates ack only. If ack/response flag is 1, 0 indicates that user read the message.

Table 101: Tracker Power Mode Message (7107)

# of bytes	Description	Value or Range
10	Header	
1	Tracker Low Power Mode Flag[1]	0 = not low power, 1 = low power
4	Tracker ID	0x00000000 – 0x3FFFFFFF
1	Padding (=0x00)	
2	Data Checksum	

[1] This flag indicates if the tracker is currently in low power mode. When trackers enter low power mode, they request a low power update slot in the RF network. The low power update rate is less frequent (1 hour) than most tracker update rates. As a result, trackers may power down between updates to conserve their vehicle's battery. Trackers in low power mode will not be able to provide immediate acknowledgement to messages. Messages sent to trackers in this mode will be queued by the NDC Server until the message is acknowledged or the message reaches its timeout.

Table 102: Tracker Profile Update Message (7104)

# of bytes	Description	Value or Range
10	Header	
8	Tracker Format[1]	
Padding[4]		

Table 103: Tracker Profile Format

# of bytes	Description	Value or Range
4	Tracker ID	0x000000(0x3FFFFFFF
1	Tracking Service	0=LOT, 1= Continuous, 2=Manual
2	Default Update Rate (in seconds)	0x0000 (0), 0x0005 (5), 0x000a (10), 0x001e (30), 0x003c (60), 0x0090 (144), 0x00e1 (225), 0x012c (300), 0x0258 (600), 0x0384 (900), 0x04b0 (1200), 0x0708 (1800), 0x0e10 (3600) (0x0000 for manual tracking trackers)
1	Bit 0: Track History Service Flag Bit 1: Message Service Flag Bit 2: Modify Update Rate Service Flag Bit 3: Modify Tracking Service Flag Bits 4-7: spare	Bit 0: 0= Not Available, 1=Available Bit 1: 0 = Not Available, 1= Available Bit 2: 0 = Not Available, 1 = Available Bit 3: 0 = Not Available, 1 = Available

Table 104: Retrieve Tracker Installation History Message (7105)

# of bytes	Description	Value or Range
10	Header	
2	Install StartYear[2] (0x0000 = All)	
1	Install Start Month[2]	1 – 12
1	Install Start Day[2]	1 – 31
1	Install Start Hour[2]	0 – 23
1	Install Start Minute[2]	0 – 59
1	Install Start Second[2]	0 – 59
2	Install End Year[2] (0x0000 = All)	
1	Install End Month[2]	1 – 12
1	Install End Day[2]	1 – 31
1	Install End Hour[2]	0 – 23
1	Install End Minute[2]	0 – 59
1	Install End Second[2]	0 – 59
2	NDCS Command Sequence ID[1]	0x0000 – 0xFFFF
2	Data Checksum	

[1] Response should use this ID value.
[2] Date range used to indicate desired tracker install date/time. If start and/or end year is set to 0x0000, the corresponding start and/or end date is NOT used to limit the result.

Table 105: Retrieve Tracker Installation History Response Message (7305)

# of bytes	Description	Value or Range
10	Header	
2	NDCS Command Sequence ID[1]	0x0000 – 0xFFFF
2	Status	0x0000 = Success, 0x0001 = Database Access Error
2	Total Response Count[2]	
2	Response Number[2]	
4	Tracker ID	0x00000000 – 0x3FFFFFFF
2	Tracker Installation Record Count (C_1)	
Variable	Tracker Installation Record #1	
...		
Variable	Tracker Installation Record #C_1	
2	Data Checksum	

[1] Respons should use the sam ID sent with the request message.

Tabl 106: Tracker Installati n Record

# of bytes	Description	Value or Range
2	VIN Length (L_1)	0x0000 – 0x0020
L_1	VIN	
2	Install Year	
1	Install Month	1 – 12
1	Install Day	1 – 31
1	Install Hour	0 – 23
1	Install Minute	0 – 59
1	Install Second	0 – 59
2	Uninstall Year[1]	
1	Uninstall Month[1]	1 – 12
1	Uninstall Day[1]	1 – 31
1	Uninstall Hour[1]	0 – 23
1	Uninstall Minute[1]	0 – 59
1	Uninstall Second[1]	0 – 59

[1] If uninstall date has not been set and/or tracker is still installed in vehicle, all uninstall date values should be set to NULL.

Table 107: Retrieve Vehicle Profile List Message (7106)

# of bytes	Description	Value or Range
10	Header	
2	VIN Count[1] (C1)	
2	VIN Length #1 (L_1)	
L_1	VIN #1	
...		
2	VIN Length #C1 (L_{C1})	
L_{C1}	VIN #C1	
2	NDCS Command Sequence ID[2]	0x0000 – 0xFFFF
2	Data Checksum	

[1] If VIN Count is 0x0000, all customer profiles are returned.
[2] Response should use this ID value.

Table 108: Retrieve Vehicle Profile List Response Message (7306)

# of bytes	Description	Value or Range
10	Header	
2	NDCS Command Sequence ID[1]	0x0000 – 0xFFFF
2	Status	0x0000 = Success, 0x0001 = Database Access Error
2	Total Number of Profiles in Response	
2	Vehicle Profile Number[2] (N)	
Variable	Vehicle Profile Format[3] #1	
...		
Variable	Vehicle Profile Format[3] #N	
2	Data Checksum	

[1] Response should use the same ID sent with the request message.
[2] Profile number N out of the total number of profiles in the profile list being returned.
[3] Se Vehicle Profile Format below.

Table 109: Vehicle Profile Format

2	VIN Length (L₁)	
L_1	VIN	
2	Alias Length (L₂)	
L_2	Alias	
2	State Length (L₃)	
L_3	State	
2	License Length (L₄)	
L_4	License	
2	Make Length (L₅)	
L_5	Make	
2	Model Length (L₆)	
L_6	Model	
2	Year	
2	Data Checksum	

Table 110: Cancel Message (7215)

# of bytes	Description	Value or Range
10	Header	
3	Message Sequence ID	
1	Padding	0x00
2	Data Checksum	

Table 111: Cancel Message Response Message (7415)

# of bytes	Description	Value or Range
10	Header	
1	Client Request ID[3]	0x00 – 0xFF
2	Status	0x0000 = Success[1], 0x0001 = Invalid Message Sequence ID, 0x0002 = Message Ack Already Received
2	Data checksum	

[1] Success indicates that no further attempt will be made to send the message. However, it's still conceivable that the message was sent.

Table 112: Modify Account Password Message (7201)

# of bytes	Description	Value or Range
10	Header	
2	Current Password Length (L₁)	0x0000 – 0x0020
L_1	Current Password	
2	New Password Length (L₂)	0x0000 – 0x0020
L_2	New Password	
1	Client Request ID[2]	0x00 – 0xFF
Padding[1]		
2	Data Checksum	

[1] 0x00 will be used for padding if necessary to make entire body word aligned.
[2] The Client Request ID is assigned by the DMCS and is returned by the NDC Server in the response message.

Table 113: Modify Account Password Response Message (7401)

# of bytes	Description	Value or Range
10	Header	
1	Client Request ID[1]	0x00 – 0xFF
2	Status	0x0000 = Success, 0x0001 = Success – NDC Server Password Only, 0x0002 = Incorrect Current Password, 0x0003 = Invalid New Password, 0x0004 = Database access error
1	Padding	0x00
2	Data checksum	

[1] The ID associated with the request sent by the DMCS.

Table 114: Modify Tracking Service Message (7202)

# of bytes	Description	Value or Range
10	Header	
4	Tracker ID	0x00000000 - 0x3FFFFFFF
2	Tracking Service	0x0000=LOT, 0x0001= Continuous, 0x0002=Manual
2	Update Rate in Seconds	0x0005 (5), 0x000a (10), 0x001e (30), 0x003c (60), 0x0090 (144), 0x00e1 (225), 0x012c (300), 0x0258 (600), 0x0384 (900), 0x04b0 (1200), 0x0708 (1800), 0x0e10 (3600)
1	Client Request ID[2]	0x00 – 0xFF
1	Padding	0x00
2	Data Checksum	

[1] The Client Request ID is assigned by the DMCS and is returned by the NDC Server in the response message.

Table 115: Modify Tracking Service Response Message (7402)

# of bytes	Description	Value or Range
10	Header	
1	Client Request ID[2]	0x00 – 0xFF
2	Status	0x0000 = Success, 0x0001 = Service Not Available[1], 0x0002 = Invalid Update Rate, 0x0003 = Invalid Tracking Service, 0x0004 = Invalid Tracker ID, 0x0005 = Requested Rate Not Currently Available
1	Padding	0x00
2	Data Checksum	

[1] The ability to modify the tracking service is an optional service that is maintained on a per tracker basis. Trackers without this service will receive this error message.
[2] The ID associated with the request sent by the DMCS.

Table 116: Ping Request Message (7203)

# of bytes	Description	Value or Range
10	Header	

Table 117: Ping Response Message (7403)

# of bytes	Description	Value or Range
10	Header	

Table 118: Resend Message (7216)

# of bytes	Description	Value or Range
10	Header	
3	Message Sequence ID	
1	Timeout[1] (in minutes)	0x00 = No Timeout, 0x01- 0xF0 = timeout value in minutes
2	Data Checksum	

[1] Indicates the maximum retry timeout value. A Message Timeout message will be sent to the CCS/DMCS if the message is not acknowledged by the timeout value. If 0x00 is specified for the timeout, the message is sent until the PROTRAK system max timeout is reached.

Table 119: Resend Message Response Message (7416)

# of bytes	Description	Value or Range
10	Header	
1	Client Request ID[3]	0x00 – 0xFF
2	Status	0x0000 = Success[1], 0x0001 = Invalid Message Sequence ID, 0x0002 = Message Ack Already Received
2	Data checksum	

[1] Success indicates that no further attempt will be made to send the message. However, it's still conceivable that the message was sent.

Table 120: Retrieve Tracker Profile List Message (7204)

# of bytes	Description	Value or Range
10	Header	
2	Number of Tracker ID's (N_1)[1]	
4	Tracker ID #1	0x00000000 – 0x3FFFFFFF
...		
4	Tracker ID #N_1	0x00000000 – 0x3FFFFFFF
1	Client Request ID[3]	0x00 – 0xFF
Padding[2]		
2	Data Checksum	

[1] Specifying 0x0000 for the number of Tracker ID's will return all of the tracker profiles associated with the customer's login account profile.
[2] 0x00 will be used for padding if necessary to make entire body word aligned.
[3] The Client Request ID is assigned by the DMCS and is returned by the NDC Server in the response message.

Table 121: Retrieve Track... Profile List Response Message (7404)

# of bytes	Descripti n	Value or Range
10	Header	
1	Client Request ID[5]	0x00 – 0xFF
2	Status	0x0000 = Success, 0x0001 = Database Access Error, 0x0002 = Invalid Tracker ID[2]
2	Total Number of Profiles in Response List	
2	Tracker Profile Number (N)[1]	
Variable	Tracker Profile #N[3]	
Padding[4]		
2	Data Checksum	

[1] Profile number N out of the total number of profiles in the profile list being returned.

[2] Invalid only applies to ID's that are not in the valid range and/or format. ID's missing from the database (or associated with other customer ID's) will result in the profile not being returned without an error code.

[3] See Tracker Profile Format table.

[4] 0x00 will be used for padding if necessary to make entire body word aligned.

[5] The ID associated with the request sent by the DMCS.

Table 122: Send Message (7205)

# of bytes	Description	Value or Range
10	Header	
2	Number of Trackers N_1[1]	0x0000 – 0x0800[5]
4	Tracker ID #1	0x00000000 – 0x03FFFFFF
...		
4	Tracker ID #N_1	0x00000000 – 0x03FFFFFF
2	Message Length (L_1)	0x0000 – 0x0050
L_1	Message	
1	Response Set ID[2]	0x0000 – 0x0007
1	Timeout[6] (in minutes)	0x00 = No.Timeout, 0x01- 0xF0 = timeout value in minutes
1	Client Request ID[4]	0x00 – 0xFF
Padding[3]		
2	Data Checksum	

[1] If the number of trackers is 0x0000, the Customer ID associated with the customer's login account profile is used.

[2] A pre-defined response set (see Pre-defined Message Response Sets) may be selected. Trackers will respond using a response ID that indicates the response selected from the pre-defined set. This response ID is returned to the DMCS in a "Message Response and State" or a "Message Response and Reduced State" packet within a "Real-time Tracking Data Message" that contains the same Message Sequence ID.

[3] 0x00 will be used for padding if necessary to make entire body word aligned.

[4] The Client Request ID is assigned by the DMCS and is returned by the NDC Server in the response message.

[5] Due to FM sub-carrier bandwidth limitations, messages sent to a large number of trackers may take several seconds (or minutes) to be delivered. Groups are expected to be small (around 20 – 60 trackers). However, the NDC Server uses an ID allocation scheme that allows it to communicate with a large number of trackers in its RF network if tracker group associations are known ahead of time. The DMCS is responsible to provide these tracker group associations.

[6] Indicates the maximum retry timeout value. A Message Timeout message will be sent to the CCS/DMCS if the message is not acknowledged by the timeout value. If 0x00 is specified for the timeout, the message is sent until the PROTRAK system max timeout is reached.

Table 123: Pre-defined Message Response Sets

Response Set ID	MDT Softkey 1	MDT Softkey 2	MDT Softkey 3	MDT Softkey 4
0[1]	{BLANK}	{BLANK}	{BLANK}	{BLANK}
1	Yes	No	Call	{BLANK}
2	OK	{BLANK}	{BLANK}	{BLANK}
3	OK	Cancel	Call	{BLANK}
4	Accept	Decline	Call	{BLANK}
5	{BLANK}	{BLANK}	{BLANK}	{BLANK}
6	{BLANK}	{BLANK}	{BLANK}	{BLANK}
7	{BLANK}	{BLANK}	{BLANK}	{BLANK}

[1] Response Set ID indicates that no pre-defined response is required. However, a custom response set may still be defined within the message. Custom response sets may be defined by appending response set values to the message. Response set values are delimited by a "|" (vertical bar) character.

Table 124: Send Message Response Message (7405)

# of bytes	Description	Value or Range
10	Header	
1	Client Request ID[3]	0x00 – 0xFF
2	Status	0x0000 = Success[1], 0x0001 = Service Not Available[4], 0x0002 = Invalid message format, 0x0003 = Message too long, 0x0004 = Invalid Tracker ID, 0x0005 = Invalid Response Set, 0x0006 = Database Access Error, 0x0007 = Service Temporarily Not Available, 0x0008 = Null Message Error, 0x0009 = Low Power Mode, 0x0010 = Out of Network
3	Message Sequence ID[2]	0x000000 – 0xFFFFFF
2	Data checksum	

[1] Success indicates that the message has been successfully queued so that it may be sent to the specified tracker(s).

[2] ID associated with the message being sent. When the tracker successfully acknowledges and/or responds to this message, the DMCS will receive a "Message Response and State" or a "Message Response and Reduced State" packet within a "Real-time Tracking Data Message" that contains the same Message Sequence ID.

[3] The ID associated with the request sent by the DMCS.

[4] If message was sent to a list of trackers, all trackers in the list must have message service available or this error code will be returned.

Table 125: Send Pre-defined Message ID Message (7206)

# of bytes	Description	Value or Range
10	Header	
2	Number of Trackers N_1[1]	0x0000 – 0x0800[4]
4	Tracker ID #1	0x00000000 – 0x03FFFFFF
...		
4	Tracker ID #N_1	0x00000000 – 0x03FFFFFF
1	Pre-defined Message ID	0x00 – 0xFF
1	Response Set ID[2]	0x0000 – 0x07
1	Timeout[5] (in minutes)	0x00 = No Timeout, 0x01- 0xF0 = timeout value in minutes
1	Client Request ID[3]	0x00 – 0xFF
2	Data Checksum	

[1] If the number of trackers is 0x0000, the Customer ID associated with the customer's login account profile is used.

[2] A pre-defined response set (see Pre-defined Message Response Sets) may be selected. Trackers will respond using a response ID that indicates the response selected from the pre-defined set. This response ID is returned to the DMCS in a "Message Response and State" or a "Message Response and Reduced State" packet within a "Real-time Tracking Data Message" that contains the same Message Sequence ID.

[3] The Client Request ID is assigned by the DMCS and is returned by the NDC Server in the response message.

[4] Due to FM sub-carrier bandwidth limitations, messages sent to a large number of trackers may take several seconds (or minutes) to be delivered. Groups are expected to be small (around 20 – 60 trackers). However, the NDC Server uses an ID allocation scheme that allows it to communicate with a large number of trackers in its RF network if tracker group associations are known ahead of time. The DMCS is responsible to provide these tracker group associations.

[5] Indicates the maximum retry timeout value. A Message Timeout message will be sent to the CCS/DMCS if the message is not acknowledged by the timeout value. If 0x00 is specified for the timeout, the message is sent until the PROTRAK system max timeout is reached.

Table 126: Send Pre-defined Message ID Response Message (7406)

# of bytes	Description	Value or Range
10	Header	
1	Client Request ID[3]	0x00 – 0xFF
2	Status	0x0000 = Success[1], 0x0001 = Service Not Available[4], 0x0002 = Invalid message format, 0x0003 = Message too long, 0x0004 = Invalid Tracker ID, 0x0005 = Invalid Response Set, 0x0006 = Database Access Error, 0x0007 = Service Temporarily Not Available, 0x0009 = Low Power Mode, 0x0010 = Out of Network
3	Message Sequence ID[2]	0x000000 – 0xFFFFFF
2	Data checksum	

[1] Success indicates that the message ID has been successfully queued so that it may be sent to the specified tracker(s).

[2] ID associated with the message being sent. When the tracker successfully acknowledges and/or responds to this message, the DMCS will receive a "Message Response and State" or a "Message Response and Reduced State" packet within a "Real-time Tracking Data Message" that contains the same Message Sequence ID.

[3] The ID associated with the request sent by the DMCS.

[4] If pre-defined was sent to a list of trackers, all trackers in the list must have message service available or this error code will be returned.

Table 127: Send Site Dispatch Message (7207)

# of bytes	Description	Value or Range
10	Header	
2	Number of Trackers N_1[1]	0x0000 – 0x0800
4	Tracker ID #1	0x00000000 – 0x03FFFFFF
...		
4	Tracker ID #N_1	0x00000000 – 0x03FFFFFF
1	Site Expiration[7]	0x00 (all trips), 0x01 – 0xff
1	Response Set ID[2]	0x0000 – 0x07
4	Northeast Latitude	
4	Northeast Longitude	
4	Southwest Latitude	
4	Southwest Longitude	
1	Message Length (L_1)	0x00 – 0x64
L_1	Message[7]	
1	Timeout[5] (in minutes)	0x00 = No Timeout, 0x01- 0xF0 = timeout value in minutes
1	Client Request ID[3]	0x00 – 0xFF
Padding[4]		
2	Data Checksum	

[1] If the number of trackers is 0x0000, the Customer ID associated with the customer's login account profile is used.

[2] A pre-defined response set (see Pre-defined Message Response Sets) may be selected. Trackers will respond using a response ID that indicates the response selected from the pre-defined set. This response ID is returned to the DMCS in a "Message Response and State" or a "Message Response and Reduced State" packet within a "Real-time Tracking Data Message" that contains the same Message Sequence ID.

[3] The Client Request ID is assigned by the DMCS and is returned by the NDC Server in the response message.

[4] 0x00 will be used for padding if necessary to make entire body word aligned.

[5] Indicates the maximum retry timeout value. A Message Timeout message will be sent to the CCS/DMCS if the message is not acknowledged by the timeout value. If 0x00 is specified for the timeout, the message is sent until the PROTRAK system max timeout is reached.

[6] Site duration indicates how long a specified site should be used. Single trip indicates that the tracker should retain the site information until the tracker enters and leaves the specified site. Every trip indicates that the tracker should indicate every time the tracker enters or leaves the specified site.

[7] Indicates the number of hours that the site is valid.

Table 128: Send Site Dispatch Response Message (7407)

# of bytes	Description	Value or Range
10	Header	
1	Client Request ID[3]	0x00 – 0xFF
2	Status	0x0000 = Success[1], 0x0001 = Service Not Available, 0x0002 = Invalid message format, 0x0003 = Message too long, 0x0004 = Invalid Tracker ID, 0x0005 = Invalid Response Set, 0x0006 = Database Access Error, 0x0007 = Service Temporarily Not Available, 0x0009 = Low Power Mode, 0x0010 = Out of Network
1	Site ID[2,4]	0x000000 – 0xFFFFFF
2	Data checksum	

[1] Success indicates that the message ID has been successfully queued so that it may be sent to the specified tracker(s).

[2] ID associated with the message being sent. When the tracker successfully acknowledges and/or responds to this message, the DMCS will receive a "Message Response and State" or a "Message Response and Reduced State" packet within a "Real-time Tracking Data Message" that contains the same Site ID.

[3] The ID associated with the request sent by the DMCS.

[4] When tracker enters and/or leaves the specified site, the DMCS will receive a "Site Status" packet containing same ID.

Table 129: Send User Data Message (7208)

# of bytes	Description	Value or Range
10	Header	
2	Number of Trackers N_1[1]	0x0000 – 0x0800[4]
4	Tracker ID #1	0x00000000 – 0x03FFFFFF
...		
4	Tracker ID #N_1	0x00000000 – 0x03FFFFFF
1	User Data Type	0x00 – 0xFF
2	User Data Length (L_1)	0x0000 – 0x0050
L_1	User Data	
1	Timeout[5] (in minutes)	0x00 = No Timeout, 0x01- 0xF0 = timeout value in minutes
1	Client Request ID[3]	0x00 – 0xFF
Padding[2]		
2	Data Checksum	

[1] If the number of trackers is 0x0000, the Customer ID associated with the customer's login account profile is used.
[2] 0x00 will be used for padding if necessary to make entire body word aligned.
[3] The Client Request ID is assigned by the DMCS and is returned by the NDC Server in the response message.
[4] Due to FM sub-carrier bandwidth limitations, messages sent to a large number of trackers may take several seconds (or minutes) to be delivered. Groups are expected to be small (around 20 – 60 trackers). However, the NDC Server uses an ID allocation scheme that allows it to communicate with a large number of trackers in its RF network if tracker group associations are known ahead of time. The DMCS is responsible to provide these tracker group associations.
[5] Indicates the maximum retry timeout value. A Message Timeout message will be sent to the CCS/DMCS if the message is not acknowledged by the timeout value. If 0x00 is specified for the timeout, the message is sent until the PROTRAK system max timeout is reached.

Table 130: Send User Data Response Message (7408)

# of bytes	Description	Value or Range
10	Header	
1	Client Request ID[3]	0x00 – 0xFF
2	Status	0x0000 = Success[1], 0x0001 = Service Not Available[4], 0x0002 = Invalid message format, 0x0003 = Message too long, 0x0004 = Invalid Tracker ID, 0x0006 = Database Access Error, 0x0007 = Service Temporarily Not Available, 0x0009 = Low Power Mode, 0x0010 = Out of Network
1	Message Sequence ID[2]	0x000000 – 0xFFFFFF
2	Data checksum	

[1] Success indicates that the messag has been successfully queued so that it may be sent to the specified tracker(s).
[2] ID associated with the message being sent. When the tracker successfully acknowledges and/or responds to this message, the DMCS will receive a "Message Response and State" or a "Message Response and Reduced State" packet within a "Real-time Tracking Data Message" that contains the same Message Sequence ID.
[3] The ID associated with the request sent by the DMCS.
[4] If user data was sent to a list of trackers, all trackers in the list must have message service available or this error code will be returned.

Table 131: Send Tracking Request Message (7209)

# of bytes	Description	Value or Range
10	Header	
4	Tracker ID	0x00000000 – 0x03FFFFFF
1	Client Request ID[1]	0x00 – 0xFF
1	Padding	0x00
2	Data Checksum	

[1] The Client Request ID is assigned by the DMCS and is returned by the NDC Server in the response message.

Table 132: Send Tracking Request Response Message (7409)

# of bytes	Description	Value or Range
10	Header	
1	Client Request ID[2]	0x00 – 0xFF
2	Status	0x0000 = Success[1], 0x0001 = Service Not Available, 0x0002 = Invalid Tracker ID, 0x0003 = Database Access Error, 0x0004 = Service Temporarily Not Available
1	Padding	0x00
2	Data checksum	

[1] Success indicates that the message has been successfully queued so that it may be sent to the specified tracker.
[2] The ID associated with the request sent by the DMCS.

Table 133: Tracker Installation Update Message (7210)

# of bytes	Description	Value or Range
10	Header	
4	Tracker ID	
8	Tracker Installation Record[1]	
Padding[4]		
2	Data Checksum	

[1] See Tracker Installation Record.

Table 134: Vehicle Profile Update Message (7212)

# of bytes	Description	Value or Range
10	Header	
8	Vehicle Profile Format[1]	
Padding[4]		
2	Data Checksum	

[1] See Vehicle Profile Format.